CLAIMS

WHAT IS CLAIMED IS:

1. A method of making a device comprising:

forming two electrodes;

creating an electric field between the two electrodes; and

forming a waveguide between the two electrodes in the presence of the electric field.

2. The method of claim 1, wherein the two electrodes are lithographically-defined on a substrate.

3. The method of claim 2, wherein the waveguide comprises an organic crystal material.

4. The method of claim 3, wherein the organic crystal material comprises an organic molecule comprising:

a doner portion, and

an acceptor portion coupled to the doner portion via a conjugated backbone.

5. An electro-optic modulator comprising:

two electrodes; and

a waveguide disposed between the two electrodes, the waveguide comprising an organic crystal.

6. The electro-optic modulator of claim 5, wherein the organic crystal comprises:

a doner portion, and

an acceptor portion coupled to the doner portion via a conjugated backbone.

7. The electro-optic modulator of claim 6, wherein the conjugated backbone comprises an aromatic ring.

8. The electro-optic modulator of claim 7, wherein the aromatic ring is a benzene ring.

9. The electro-optic modulator of claim 5, wherein the waveguide was formed in the presence of an electric field created between the two electrodes.

10. The electro-optic modulator of claim 5, wherein the waveguide is a non-centrosymmetric organic material with substantially aligned dipole moments.

11. The electro-optic modulator of claim 10, wherein the dipole moments were aligned using an electric field created between the two electrodes.

12. A method of making an electro-optic modulator comprising:

forming two electrodes on a substrate;

depositing a dielectric layer at least partially between the two electrodes;

creating an electric field between the two electrodes;

forming a waveguide over the dielectric layer in the presence of the electric field; and

depositing a top cladding over the waveguide.

13. The method of claim 12 further comprising:

polishing the waveguide prior to depositing the top cladding.

14. The method of claim 13 further comprising:

polishing the waveguide down to a top surface of the two electrodes.

15. The method of claim 12, wherein forming of the waveguide further comprises:

growing a crystal by a controlled cooling of a melt .

16. The method of claim 15, wherein the crystal comprises an organic molecule comprising a donor, an acceptor, and a conjugated backbone.

17. The method of claim 12, wherein forming of the waveguide further comprises:

growing a crystal by controlling a rate of evaporation of a solution.

18. The method of claim 17, wherein the crystal comprises an organic molecule comprising a donor, an acceptor, and a conjugated backbone.

19. The method of claim 12, wherein forming of the waveguide further comprises:

aligning dipole moments of the waveguide with the electric field as the waveguide crystallizes.

20. The method of claim 12 further comprising:

applying a voltage to the two electrodes to modulate a light signal in the waveguide.

21. A method of changing a phase of an optical signal in an electro-optic modulator comprising two electrodes and an organic crystalline waveguide situated between the two electrodes, the organic crystalline waveguide having dipole moments substantially aligned in a common orientation, the method comprising:

introducing the optical signal into the organic crystalline waveguide; and

applying a voltage to the two electrodes.

22. The method of claim 21, wherein applying the voltage to the two electrodes changes a refractive index of the organic crystalline waveguide.

23. An optical system comprising:

a laser;

an electro-optic modulator comprising two electrodes and an organic crystal waveguide between the two electrodes, the waveguide having its dipole moments substantially aligned in a common direction, the waveguide positioned to receive a light signal from the laser, the electrodes of the waveguide coupled to a signal input.

24. The optical system of claim 23 further comprising:

an amplifier to amplify a modulated light signal from the electro-optic modulator.

25. The optical system of claim 24 further comprising:

a MUX/DEMUX coupled to the electro-optic modulator.

26. The optical system of claim 25, wherein the MUX/DEMUX is an array waveguide grating.

27. An electro-optic modulator comprising:

a splitter;

a coupler; and

a phase modulator comprising an organic crystal having its dipole moments substantially aligned in a common direction, wherein the splitter is coupled to direct a first portion of a light signal to the phase modulator and a second portion of the light signal to the coupler, and the coupler

is coupled to recombine an optical signal output from the phase modulator with the second portion of the light signal.

28. The electro-optic modulator of claim 27, wherein the splitter and the coupler are the same device.